

ART. VII.—*The Tidal Datum of Hobson's Bay.*

BY R. L. J. ELLERY, F.R.S.

[Read 14th August, 1879.]

THE chief object of these brief notes is to place on record in the transactions of our Society as succinct a history as I am able to gather of the tide or sea-level datum of Hobson's Bay. The history of measurements hitherto made is somewhat broken, and when, on several occasions, questions have arisen regarding high-water mark, mean tide level, &c., search had to be made in various directions, and the results obtained were found to be doubtful and discrepant. As it is of the highest importance in all matters concerning the conservation of our port, as well as in the disposal of littoral lands, that we should possess trustworthy and precise data, I propose, after sketching a brief history of the question, to furnish the height of various bench marks and points with reference to accurate measurements made a few years ago by Mr. A. C. Allan and myself, with the hope that the vagueness that has hitherto surrounded this question may be set at rest.

A self-registering tide-gauge was first erected in the waters of Port Phillip at Williamstown in 1858, by the Harbour Department, and placed in charge of the Observatory in June of that year. Soon after, however, it was transferred to the care of the Admiralty surveyors, and it was not until January, 1874, that it came again under the supervision of the Observatory. Since that time a careful and continuous record of the tides has been secured and tabulated every week. Prior to the erection of the gauge the tidal datum was obtained by regular eye observations of the surface of the water at the mouth of the river, and at one or two other places in Hobson's Bay. These observations, however, were taken principally for the purpose of indicating to the shipping the height of water in the river, and furnished no accurate data as to sea level.

In the earlier operations of the marine survey by Captain Ross, a datum was established by means of a graduated tide board, referred to the bench mark on the sill of the light-house, Gellibrand's Point, which was, and is, I believe, still

used as the datum of all our railway and other systems of levels. No very precise information as to the vertical distance between this bench mark and the tidal datum adopted in the earlier part of the survey of the bay can be found, but Captain Cox, in 1864, after discussion of two years' records of the self-registering tide-gauge, adopted the following:—Sill of lighthouse above high-water springs, 7·27; low-water do., 9·94; mean tide, 8·60. On a subsequent examination of these numbers it was found that a very obvious error had been made in referring the tide-gauge scales at the tide-gauge house to the lighthouse datum, and that they should have been as follows:—High-water springs, 5·95; low-water do., 7·62; mean tide, 6·78. This distance at low-water springs was subsequently adopted by succeeding Admiralty surveyors.

Nearly all the Admiralty surveyors, as well as others who occasionally made surveys in connection with the silting up of Hobson's Bay, affixed, for facility of reference, a graduated scale to the outside of the tide-gauge house, and dipping the water. These were fixed alongside of and sometimes over one another, and although several have got destroyed by boats, there are still five, differing more or less among themselves. No doubt this proceeding has been a fruitful source of errors, as well as of discrepancies, in compared results of surveys.

In 1871 a law case, involving the accurate definition of high-water mark on a part of the shores of Hobson's Bay, led to an investigation of the tide records and a revision of the various tide data. This was undertaken by Mr. A. C. Allan and myself, as already mentioned, and we made a very careful series of measurements of the vertical distance between the sea surface and the various *datums*. Thinking it would be convenient, and perhaps facilitate future references, if an imaginary datum below the lowest probable tides were adopted, we reduced all our measurements to a zero 10 ft. below the sill of the lighthouse, and the following will give various points referred to this zero:—

	Feet above datum.		
Tide Zero	0·00
Sill of Lighthouse	10·00
N.E. corner Dock Basin	10·55
Low-water Springs	2·38
B.M. niche Prince's Bridge	17·69
Door-step of Observatory	93·31

One reason for adopting the new zero was that negative numbers and measurements in dealing with tide-gauge records, or soundings in surveys, would be thus avoided.

It is to be regretted that no precise references of mean tide level in the earlier days can be found. Where measurements do exist they are lacking in accurate information as to state of tides, and I can find nothing trustworthy upon which to base any statement as to change of sea-level since surveys have been made. I think it desirable that permanent bench marks on the natural beds or faces of rocks *in situ* should be established around our bay, carefully connected by accurate levelling with one another and with the tide-gauge, for it is very doubtful if bench marks on buildings can be assumed to afford a permanent datum.

ART. VIII.—*On the Method of Calculating the Increment
in the Value of Land.*

BY ALEXANDER SUTHERLAND, M.A.

[Read 14th August, 1879.]

It ought to be well enough known in these enlightened times that a sum of money invested for a long term of years at a fair rate of interest, without being disturbed, will be converted into a sum quite enormous compared with the original investment; and yet the public mind is from time to time disturbed by fallacies originating in a comparison of first sum and its result without allowing for the action of compound interest. A man, for instance, may have spent £100 in buying a piece of land fifty years ago; he may have done nothing with it, and yet the land may now be worth the handsome little fortune of £11,731. When people learn this fact they are surprised beyond measure, and imagine the case quite exceptional; they fancy the man has got an enormous profit, and some of his poorer neighbours look upon the process as almost dishonest; whereas, as a matter of fact, he has got only 10 per cent. per annum on his investment. The present form that this fallacy takes is the demand that Government should retain possession of the